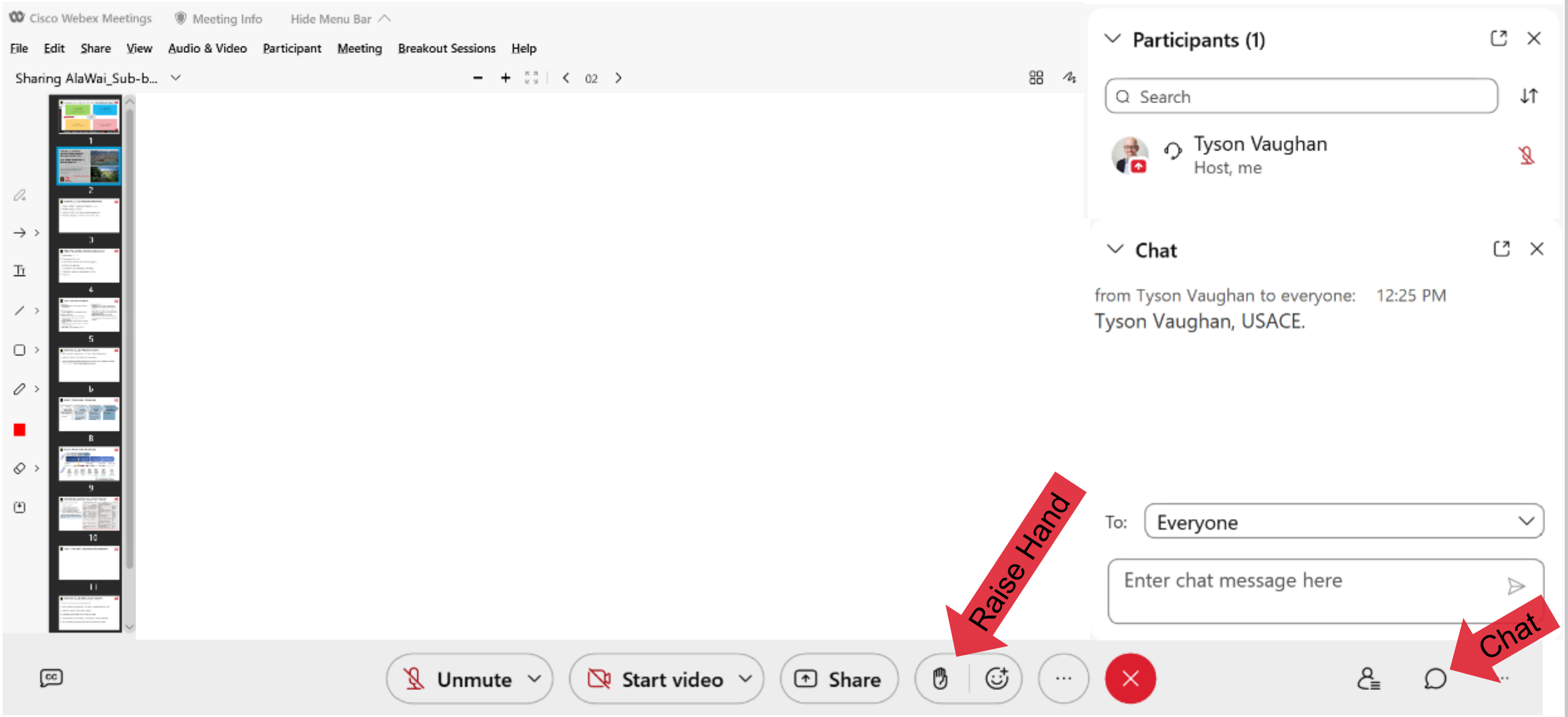
WELCOME! WHO DO WE HAVE WITH US?



ALA WAI FLOOD RISK MANAGEMENT GENERAL RE-EVALUATION STUDY

SUB-BASIN WORKSHOP 3: ALA WAI CANAL & LOWER WATERSHED

US Army Corps of Engineers (USACE)
City and County of Honolulu (CCH)

14 April 2022

*This session is being recorded.

US Army Corps of Engineers®

SCHEDULE: SUB-BASIN WORKSHOPS

1. April 1, 2022 (F): Makiki and Pālolo Sub-basins
2. April 8, 2022 (F): Mānoa Sub-basin
3. **April 14, 2022 (Th): Ala Wai Canal and Lower Watershed**
4. April 22, 2022 (F): Continued discussions

HIGHLIGHTS: MĀNOA WATERSHED WORKSHOP

1. Continued constructive interest and engagement
2. Appreciation for value of measure tracker and these workshops
3. Importance of local knowledge and expertise
4. Importance of deep collaboration between federal, state and local agencies
5. Continued concern about debris management and stream maintenance
6. Concern about Woodlawn stormwater drainage ditch
7. Concern about effects of new developments in watershed (e.g., senior housing facility and college dorm)
8. Preference for *underground* detention

TODAY'S AGENDA: LOWER WATERSHED

1. Introduction (5 min) ← You are here!
2. Presentation (20 min)
3. Breakout discussion setup (3 min)
4. Facilitated breakout discussions (40 min)
5. Wrap-up (2 min)

HOSTS & DISCUSSANTS

Presenters (USACE):

- **Eric Merriam**, PhD, PMP; Planner; *Study Lead*
- **Cindy Acpal**, Project Manager

MC / Lead Facilitator (USACE):

- **Tyson Vaughan**, PhD; Sociologist

Additional Facilitators (USACE):

- **Kelley Philbin**, PE; Engineer; *Technical Lead*
- **Susan Henshaw**, Planner

Discussant (USACE):

- **Jeffrey Herzog**, Deputy Chief, Civil and Public Works

Discussants (CCH):

- **Alex Kozlov**, PE; Director, Department of Design and Construction, City & County of Honolulu
- **Haku Milles**, PE, LEED AP; Deputy Director, Department of Design and Construction, City & County of Honolulu
- **Matthew Gonser**, AICP, CFM; Chief Resilience Officer, Office of Climate Change, Sustainability and Resiliency, City & County of Honolulu

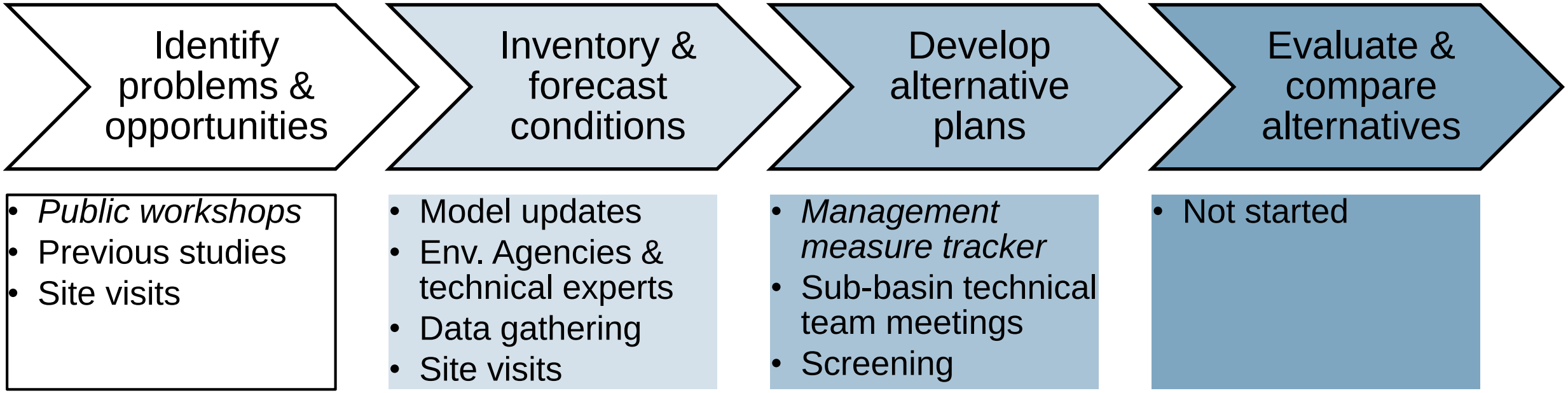
GROUND RULES: PRESENTATION

1. Post comments and questions in the chat or hold until breakouts.

2. Keep your audio on mute during the presentation.

3. If you are having technical difficulties, let us know via the chat and/or email to Tyson Vaughan: Earl.T.Vaughan@usace.army.mil.

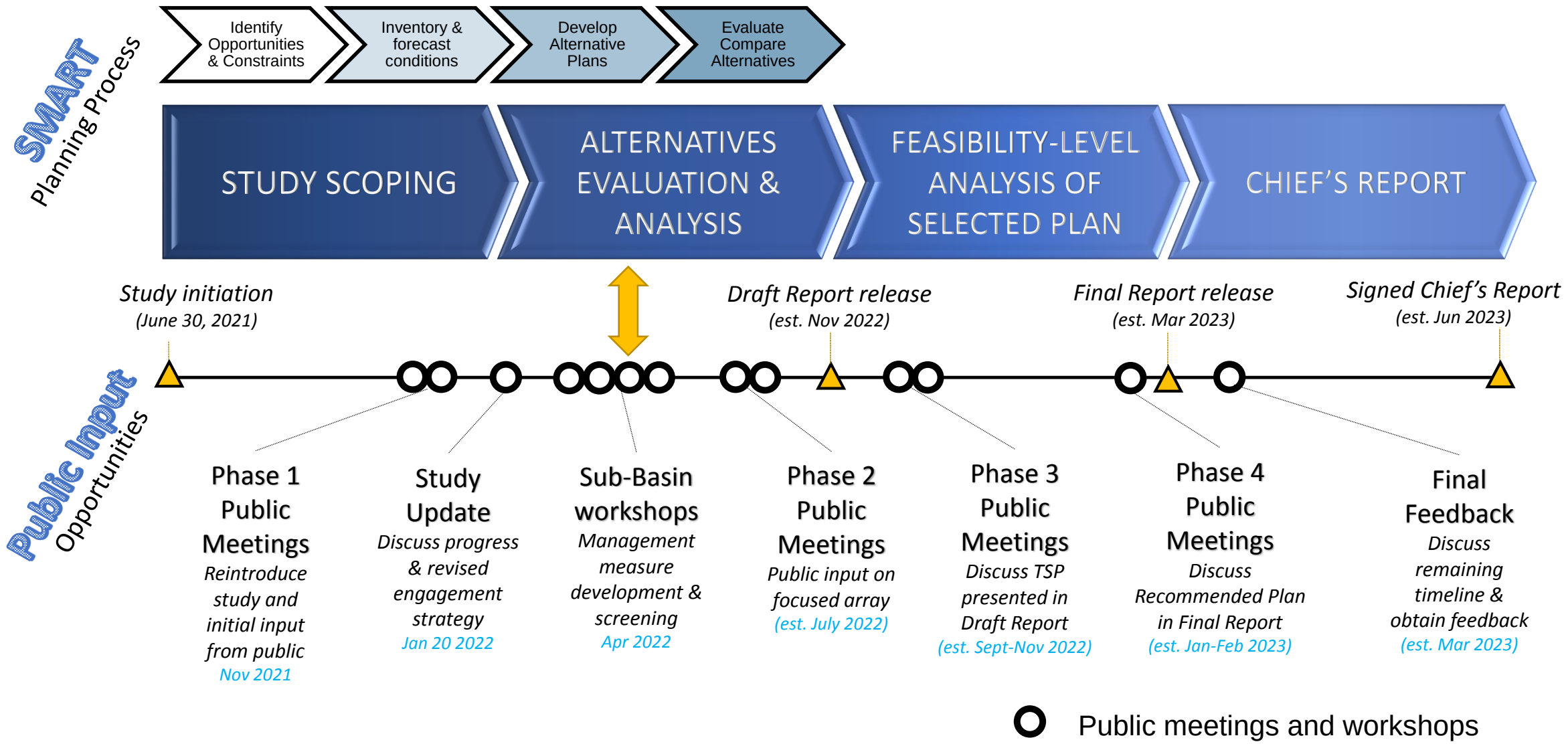
STUDY PROCESS & PROGRESS



Progress Since Last Public Information Meeting:

- Hydrologic & hydraulic model updates and calibration
- Completed sub-basin management measure development meetings
- Initial round of management measure screening (ongoing)
- Technical team site visit from March 21-24

STUDY PROCESS & PROGRESS



MANAGEMENT MEASURE TRACKER

Management measure tracker:

- Available at:

  https://www.honolulu.gov/alawai/resources.html

- Updated prior to public meeting
- Focused, real-time feedback on technical & planning process

208 measures being tracked

- 48 screened from further consideration
- 160 still under consideration

Meetings will not cover all measures

Analyses will be ongoing & updated in tracker

Ala Wai Flood Risk Management GR Study - Management Measure Tracking Spreadsheet

last updated: March 31, 2022

Tracking #	Measure Name	Location	Description	Status	Notes/Rationale
1	Flap gates on storm drains	Ala Wai Blvd. between Kalakaua and Ala Moana Blvd.	During high tide Ala Wai Blvd. between Kalakaua and the cul de sac ending at Ala Moana Blvd. floods. Ala Wai canal in this area needs flap gates to keep Ala Wai Canal water from flooding storm drains and flooding streets.	Under consideration	Provision, modification, and/or maintenance of drainage systems to capture and convey interior runoff in urban areas is a non-Federal responsibility and therefore cannot be included in a recommendation made as a result of this general reevaluation report. However, this study can make modifications to natural stream channels or previously modified natural waterways that help reduce backup within adjacent drainage systems.
2	Elevate canal walls	Ala Wai Canal	Increase canal capacity by elevating the existing canal floodwalls	Under consideration	
3	Deepen the canal	Ala Wai Canal	Excavate to deepen the existing canal and stabilize existing floodwalls.	Screened Out	Dredging to the maintenance elevation is encouraged for the City to maintain consistently. Deepening the canal further than the maintenance elevation is generally not recommended due to the stability of canal walls and slope stability. Increasing storage of the canal can technically reduce flooding but not without instability of the structural components of the bridges and canal walls. The integrity of the canal walls as-is would not withstand excavation - only replacing with an entirely new system would. Further analysis is needed to determine the stability of bridge pier and footings. See measure 5.
4	Deepen canal for periodic pump drainage	Ala Wai Canal	Dig existing walls deeper to turn the canal into a periodic pump drainage to address inundation by all three sources of flooding	Screened Out	Digging the existing walls deeper is not recommended due to their strucutral integrity. Pumping the canal to increase storage capacity is not recomended due to stability of the existing canal walls. Hydrostatic pressure is likely needed for structural stability. Technical analysis needed to determine structural stability of bridge piers and footings. See measure 5.
5	Deepen the canal, replace canal walls with higher flood protection	Ala Wai Canal	Dredge canal down to its original depth of 15' to 25', and replace the degraded infrastructure with new canal walls that are set for greater flood protection	Under consideration	The integrity of the canal walls as-is would not withstand greater dredging efforts than maintence dredging - only replacing with an entirely new system would. Further analysis is needed to determine the appropriate wall height, the stability of bridge pier and footings, and the optimal depth that balances slope stability and flood storage.
6	Widen canal	Ala Wai Canal	Widen the canal to provide greater flow and storage capacity.	Under consideration	Widening the canal in strategic locations, namely at the Eastern end of the canal, could provide more flood storage. Further analysis is needed. Widening the canal for the entire length would require extensive real estate acquisitions with significant costs. Expanding canal storage through the use of floodwalls and/or utilizing existing storage areas along the canal (e.g., golf course, Ala Wai Community Park) are likely more efficient and are considered elsewhere.
7	Dredge Ala Wai Canal to original depth	Ala Wai Canal	Dredge canal down to its original depth of 15' to 25' since current dredging only goes down to 12'.	Screened Out	Dredging to the maintenance elevation is encouraged for the City to maintain consistently. Deepening the canal further than the maintenance elevation is generally not recommended due to the stability of canal walls and slope stability. Increasing storage of the canal can technically reduce flooding but not without instability of the structural components of the bridges and canal walls. The integrity of the canal walls as-is would not withstand excavation - only replacing with an entirely new system would. Further analysis is needed to determine the stability of bridge pier and footings. See measure 5.
8	Dredge Manoa-Palolo	Manoa-Palolo Channel	Dredge the Manoa-Palolo channel	Under consideration	
9	Canal clean ups	Ala Wai Canal	Involve the community to conduct regular clean ups	Screened Out	Organizing clean-ups is outside the scope of the current study. Community involvement for clean ups after construction is a possibility; however, those initiatives those initiatives need to be initiated by other entities.
10	Effective Microorganisms (EM) to eliminate sludge	Ala Wai Canal	Use "genki balls" to clean up and eliminate sludge in the canal. These healthy microorganisms work to digest sludge in the canal which will help not only to evacuate water from the canal quicker, but also restore the ecosystem and reduce frequency for dredging.	Screened Out	Sludge eliminated by the genki balls would have to be extensive enough to reduce flood risk in order to be justified under the current study. Genki balls would eliminate the organic matter within the canal, which only makes up a small portion of material within the canal. Genki balls as a standalone measure would not provide enough reduction in material to increase storage capacity of the canal and reduce flood waters. Genki balls could be incorporated into a separate effort focused on ecosystem restoration.
11	Oysters to clean the canal	Ala Wai Canal	Use oysters as filters to clean the canal waters.	Screened Out	Improving water quality is outside the scope of this project.
12	Debris management	Watershed wide	Better manage the debris that ends up in the canal	Under consideration	Debris management will likely be most effective when utilized in conjunction with other measures (e.g., combined storage/debris management basins; structural modifications to bridges).
13	Submersible pumps	Ala Wai Canal	Use underwater pumps to create a lower profile pumping station	Under consideration	
14	Miter gates	Ala Wai Canal	Use several smaller radius miter gates to minimize visual impacts (to be used in conjunction with pump station)	Under consideration	
15	Lowered gate structure	Ala Wai Canal	Use a lowered structure underwater that could be raised in an event instead of a miter dam. (to be used in conjunction with pump station)	Under consideration	
16	Retractable flood barriers	Ala Wai Canal	Relocate pump station to the golf course. Use a series of retractable flood barriers that would allow for 4 rowing lanes (44' wide) across the width of the canal.	Under consideration	

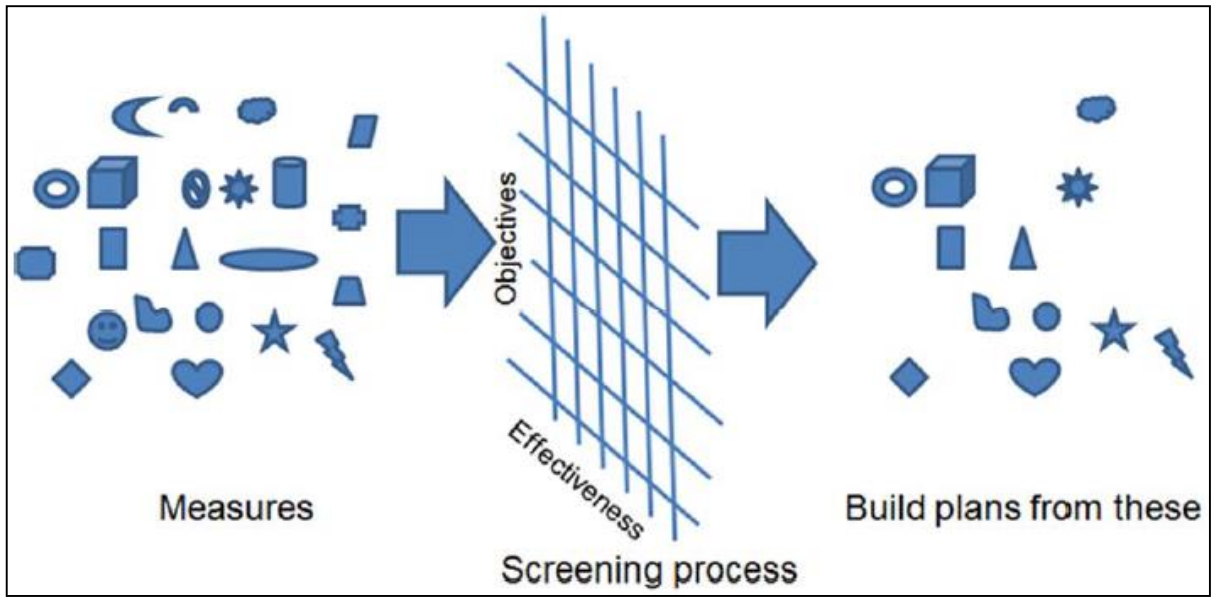
NOTE: Only displaying measures 1-16 of 208 total.

MEASURE SCREENING: PROCESS

Iteration 1 (Complete)

Screening criteria:

- Study Authority – Is it within study authority?
- Technical Feasibility – Is it technically feasible?
  - Existing data and conditions, engineering standards and best practices



Iteration 2 (Ongoing)

Screening/tiering criteria:

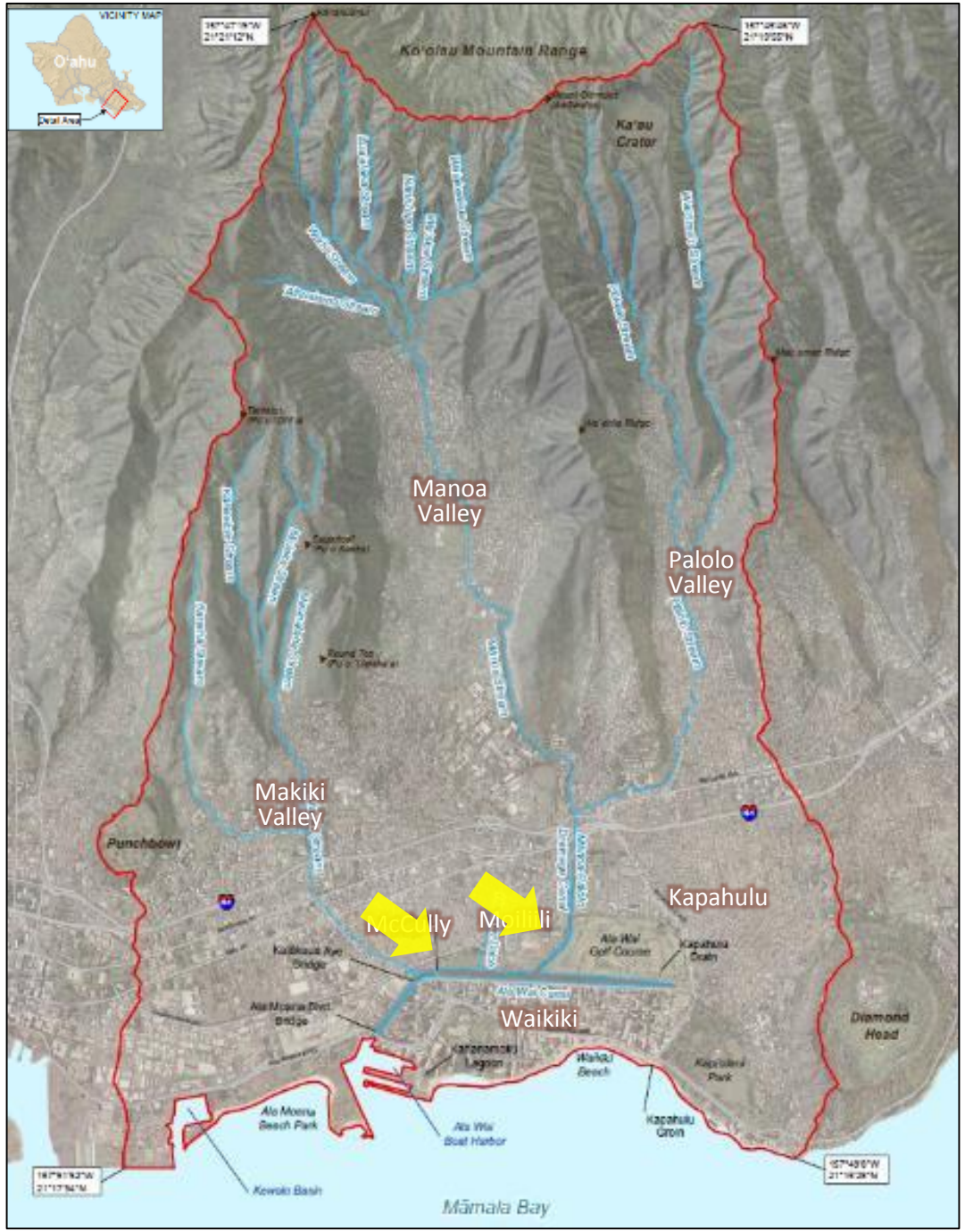
- Effectiveness – Extent it would reduce life risk and/or economic damages.
- Efficiency – Expected cost-effectiveness.
- Environmental Considerations – Benefits/impacts.

Existing models/data: water volumes, expected damages, high-level costs

Tiering to prioritize analyses:

- Tier 1: Highest analytical priority. Results could screen other measures.
- Tier 2: Assessed after Tier 1 measures.
- Tier 3: Assessed after Tier 2 measures.

Not a hierarchy of importance. Allows team to maximize efficiency. All measures will be assessed.


Ko'olau Mountain Range
Ka'au Crator
Manoa Valley
Palolo Valley
Makiki Valley
Punchbowl
Kapahulu
Waikiki
Diamond Head
Ala Moana Beach Park
Ala Wai Boat Harbor
Kapahulu Groin
Kewalo Basin
Māmala Bay

WATERSHED WIDE NATURAL & NATURE-BASED

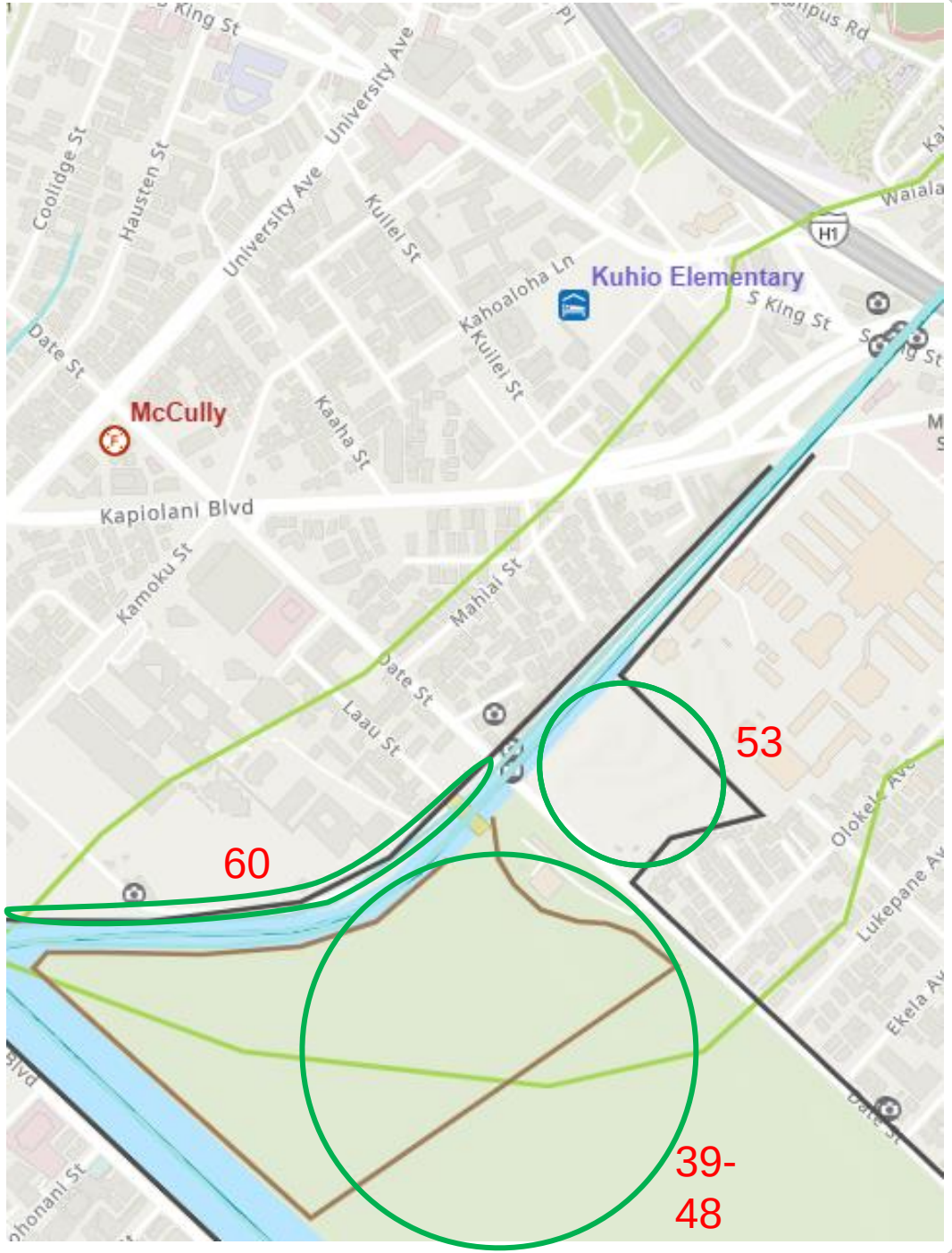
No.	Measure Name	Notes	Status / next steps
65 91 92	Forest/Invasive Management	Modeling will be conducted to quantify the extent to which forest management reduces flood risk.	Tier 1 for hydrologic modeling
104	Decrease imperviousness	Modeling will be conducted to quantify the extent to which decreasing impervious surfaces throughout the watershed reduces flood risk.	Tier 1 for hydrologic modeling
61	Nature based approach to integrate recreation	Use nature-based approach that integrates recreation into reserved flood areas (when not flooded). This can enhance this project as a community asset. Maybe tie into Lei of Parks idea (system of paths and bike lanes linking the City's regional and local parks).	Under consideration
184	Nonstructural measures	Potential for nonstructural measures (e.g., elevation, floodproofing, relocation, flood warning systems) will be assessed once economic models are finalized.	Tier 1 for economic modeling
96 97 188	Debris Management	Modeling to assess potential problem areas for debris buildup will be completed first. Specific management measures will then be identified.	Under consideration
83 112 114 124	Wetlands, agriculture	Storage requirements and potential will be modeled initially. Potential for incorporation of wetlands and/or agricultural features will then be assessed.	Under consideration
41	Ala Wai Golf Course	Convert the golf course to wetlands.	Under consideration

‘Under consideration’ indicates that it has not yet been assessed under the second screening iteration to-date.

LOWER WATERSHED MEASURES: STRUCTURAL

No	Measure Name	Description	Status
53	Kaimuki High Detention Basin	Utilize Kaimuki High School's football field	Tier 1
39-48	Golf course detention basin	Modeling of the golf course area will seek to identify the optimal solution, including how/where to divert water from, extent of additional storage needed to reduce flood risk, and potential for application of natural and nature-based measures.	Tier 1
60	Berm/floodwall around Iolani and Ala Wai Elementary Schools	This would provide protection to Iolani School, Ala Wai Elementary school, and the mauka side neighborhoods (the Manoa-Palolo overtopped in the past).	Under consideration


Kaimuki High School Field



ALA WAI CANAL MEASURES

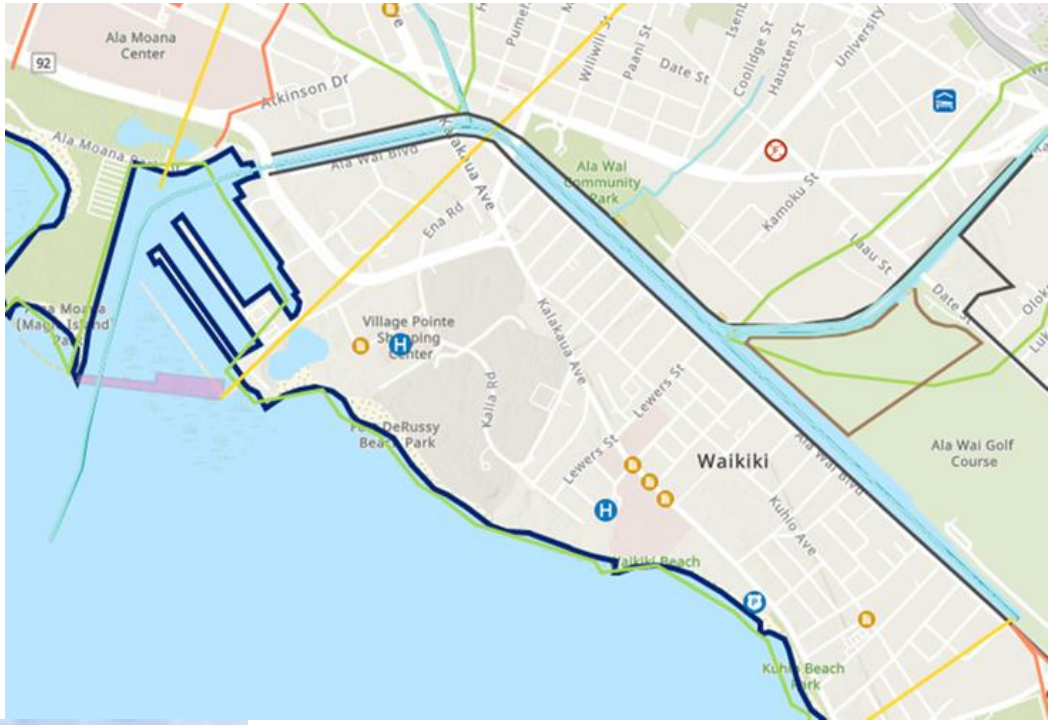
No.	Measure name	Description	Status
32	Retention or Detention pond	Implement retention or detention pond or a constructed wetland at Ala Wai Community Park.	Tier 1
33	Redesign of Ala Wai Community Park	Redesign the Ala Wai Community Park into a flood park with wetlands and taro patches. Redesign areas of the park for community access and visitor education.	Under consideration
34	Detention basin for mauka drainage storage	There are a number of drainage system outfalls that either run through the Ala Wai Community Park or along its perimeter (drainage systems coming down Isenberg or University for example). Reengineer the baseball fields to use as detention basins serving these drainage systems. Perhaps rerouting the section of shared use path that runs along the canal to the mauka side of the baseball fields and double as a berm.	Tier 1

ALA WAI CANAL MEASURES

No.	Measure Name	Description	Status
1	Flap gates on storm drains	During high tide Ala Wai Blvd. between Kalakaua and the cul de sac ending at Ala Moana Blvd. floods. Ala Wai canal in this area needs flap gates to keep Ala Wai Canal water from flooding storm drains and flooding streets.	Under consideration
2	Elevate canal walls	Increase canal capacity by elevating the existing canal floodwalls	Under consideration
5	Deepen the canal, replace canal walls with higher flood protection	Dredge canal down to its original depth of 15' to 25', and replace the degraded infrastructure with new canal walls that are set for greater flood protection	Under consideration
6	Widen canal	Widen the canal to provide greater flow and storage capacity.	Under consideration
8	Dredge Manoa-Palolo	Dredge the Manoa-Palolo channel	Under consideration

ALA WAI CANAL MEASURES

No.	Measure Name	Description	Status
13	Submersible pumps	Use underwater pumps to create a lower profile pumping station	Under consideration
14	Miter gates	Use several smaller radius miter gates to minimize visual impacts (to be used in conjunction with pump station)	Under consideration
15	Lowered gate structure	Use a lowered structure underwater that could be raised in an event instead of a miter dam. (to be used in conjunction with pump station)	Under consideration
16	Retractable flood barriers	Relocate pump station to the golf course. Use a series of retractable flood barriers that would allow for 4 rowing lanes (44' wide) across the width of the canal.	Under consideration
18	Pump via conduits	Pump flood waters via pipes, conduits or microtunnels to harbor instead of using high walls	Under consideration



ALA WAI CANAL MEASURES

No.	Measure Name	Description	Status
20	Microtunnel through Waikiki	Several microtunnels along the canal (i.e. under Paoakalani Ave, Ohua Ave, Liliuokalani Ave, Kanekapolei St, Nohonani St, Lewers St, Kalaimoku St, etc.), going under Waikiki and straight out to the ocean to increase conveyance	Under consideration
21	2nd outlet on east end of canal (open canal)	Open up the east end of the canal with an open system extending down Paki Ave and makai through Kapiolani Park	Tier 2
22	2nd outlet on east end of canal (underground)	Extend the canal underground with a box culvert running beneath Paki Ave down Kapahulu Ave. or Monsarratt Ave.	Tier 2
23	East canal buried pipe system	Put a buried pipe system with a two-way pump on the east end of the canal. During storms, the pump can evacuate water from the canal or as regular maintenance the pump can reverse to bring fresh sea water to help circulate the canal. 30 cfs of seawater can accomplish both reduced sedimentation and improved water quality.	Under consideration
190	Paki Ave Bypass	Utilize existing storm sewer system along Paki Ave as a bypass for Ala Wai Canal waters; Outfall is away from the highly traveled beach and tourist area; Existing outfall near Tahitienne Condos of Honolulu	Tier 2
191	Leahi Ave Bypass	Utilize existing storm sewer system along Leahi Ave as a bypass for Ala Wai Canal waters; Outfall is away from the highly traveled beach and tourist area; Existing outfall near Tahitienne Condos of Honolulu	Tier 2

ALA WAI CANAL MEASURES – SCREENED OUT

No.	Measure name	Description	Status
3	Deepen the canal	Excavate to deepen the existing canal and stabilize existing floodwalls.	Screened Out
4	Deepen canal for periodic pump drainage	Dig existing walls deeper to turn the canal into a periodic pump drainage to address inundation by all three sources of flooding	Screened Out
7	Dredge Ala Wai Canal to original depth	Dredge canal down to its original depth of 15' to 25' since current dredging only goes down to 12'.	Screened Out
9	Canal clean ups	Involve the community to conduct regular clean ups	Screened Out
10	Effective Microorganisms (EM) to eliminate sludge	Use "genki balls" to clean up and eliminate sludge in the canal. These healthy microorganisms work to digest sludge in the canal which will help not only to evacuate water from the canal quicker, but also restore the ecosystem and reduce frequency for dredging.	Screened Out
11	Oysters to clean the canal	Use oysters as filters to clean the canal waters.	Screened Out
27	Floodwalls on Waikiki side only	Build floodwalls only on the Waikiki side of the canal. Do not build floodwalls on the Moiliili side of the canal.	Screened out
31	Dam at canal mouth	Replace high wall ideas on either side of the Ala Wai canal with a dam at the end of the canal where it exits by Ala Moana Blvd. (at the narrow opening after Ala Moana Blvd between the Waikiki Yacht Club and the Prince Waikiki Hotel). Force the water to exit from the Ala Wai water channel but not enter from the ocean into the Ala Wai canal. Secondly, water from high rain days could be diverted with above ground pipes away from the Ala Wai canal.	Screened out

DISCUSSION GROUPS

Webex main room. (here)
Facilitator: Susan Henshaw

Discussion group 1.
Facilitators: Tyson Vaughan and Kelley Philbin (technical lead)

Discussion group 2.
Facilitators: Eric Merriam (study lead) and Cindy Acpal (project manager)

(Random assignment.)

QUESTIONS FOR YOU

1. What questions do you have about the screening process?
2. What questions do you have about specific measures described today?
3. What questions do you have about other measures not mentioned yet?
4. Have we captured measures appropriately thus far?
5. Are we still missing any additional measures for this sub-basin?
6. What topics/measures do you want to discuss or learn more about in next week's workshop (Friday, April 22nd)?

GROUND RULES: DISCUSSION GROUPS

1. Post comments and questions in the chat or use the “raise hand” tool.
2. Keep your audio on mute unless speaking.
3. Introduce yourself briefly the first time you speak.
4. When speaking, be conscious of acronyms and technical language.
5. Be mindful and help ensure that others have a chance to speak.

MAHALO

Thank you for your participation! Please stay engaged:

- Email the project team: AlaWai@Honolulu.gov.
- Post more ideas on Crowdsource Reporter! (until April 30) https://lrp.maps.arcgis.com/apps/CrowdsourceReporter/index.html?appid=df9e77cff6454945ad3dc75716a044ec
- Check the project website: https://www.honolulu.gov/AlaWai.
  - Sign up for additional meeting notifications
  - Updated management measure tracker
  - Updated FAQs
  - Comment form
  - Link to Crowdsource Reporter